UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 10/622,774 | 07/21/2003 | David Hildebrand | 50229-377 | 4235 |

7590 11/28/2006

MCDERMOTT, WILL & EMERY
600 13th Street,, N.W.
Washington, DC 20005-3096

| EXAMINER | |
|---|---|
| KUMAR, VINOD | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 1638 | |

DATE MAILED: 11/28/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/622,774 | HILDEBRAND ET AL. | |
| | Examiner | Art Unit | |
| | Vinod Kumar | 1638 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *18 September 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-19* is/are pending in the application.

4a) Of the above claim(s) *15-19* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-14* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *20 January 2004* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *05/14/2004*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

## DETAILED ACTION

### *Election/Restriction*

1. Applicant's election with traverse of Group I, claims 1-14 in the paper filed on September 18, 2006 is acknowledged. Applicant's response was due on April 14, 2006. However, Applicants provided PTO receipt card indicating that response was filed on April 14, 2006 (response, page 4). Accordingly, response filed on September 18, 2005 would be considered as timely filed response.

In the paper filed on September 18, 2006, Applicants argue that to review Groups I and II together is not unreasonable burden on the Examiner, because the Examiner must search the vector, the isolated nucleic acid molecule encoding a delta 12-fatty acid epoxygenase enzyme, the chimeric gene, and the chimeric construct for both groups (response, page 3, last paragraph).

Applicant's arguments were fully considered but were not found persuasive. Examiner maintains that searching the inventions of Groups I and II together would result in undue search burden for the reasons of record stated in the Office action mailed on March 14, 2006. For example, searching the invention of Group II would result in additional search burden for searching different methods of producing delta 12-fatty acid epoxygenase using any microbial or plant expression systems. The search would also involve searching the art pertaining to different methods of isolating and purifying 12-fatty acid epoxygenase from microbial and/or plant cells. Accordingly, claims 1-14 are being examined on merits in the instant Office action. Claims 15-19 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn

to a non-elected invention. Elected claims must be amended to remove non-elected subject matter. This restriction is made FINAL.

Applicant are reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

***Information Disclosure Statement***

2. An initialed and dated copy of Applicant's IDS form 1449 filed on 05/14/2004 is attached to the instant Office action. Document No. EP 0267159A2 was not considered because english translation was not provided. Document No. EP0674725B1 was also not considered because IDS fails to identify Pantentee or Applicant of the cited document.

***Specification***

3. The disclosure is objected to because of the following informalities:

Page 1, title, insert --e-- between "R" and "combinant".

4. The abstract of disclosure is objected to because of the following informalities:

Page 23, abstract, line 1, delete extra spaces before "A chimeric".

Appropriate corrections are required.

### *Drawings*

5. Drawings are objected to because they fail to comply with 37CFR 1.83(a). New corrected drawings in compliance with 37 CFR 1.121(d) are required in this application because Figures 1 and 2 have sequences that are included in the sequence listing. Applicants are advised to employ the services of a competent patent draftsperson outside the Office, as the U.S. Patent and Trademark Office no longer prepares new drawings. The corrected drawings are required in reply to the Office action to avoid abandonment of the application. The requirement for corrected drawings will not be held in abeyance.

### *Claim Objections*

6. Claims are objected to because of the following informalities:

In claim 1, line 1, insert --comprising a nucleotide sequence--after "molecule" and before "encoding".

In claims 12 and 14, lines 1 and 7, insert --comprising a nucleotide sequence-- after "molecule" and before "encoding".

Appropriate corrections are required.

### *Claim Rejections - 35 USC § 112*

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 1-14 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1-4, 12 and 14 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite in their recitation "analogue", which is confusing since it unclear what is intended? Specification on page 8, lines 8-11 describe that "analogue" would include non-nucleotide constituents. It is unclear how a nucleotide sequences comprising non-nucleotide constituents would encode a polypeptide.

Claims 1-4, 12 and 14 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite in its recitation "derivative", which is confusing, since it is unclear what is retained in the derived product. Specification on page 8, lines 12-17 gave examples but did not define the term "derivative".

In claim 5, it is suggested that "complement" be amended to "full complement". Otherwise, it reads on a 2 mer sequence or a different sequence.

Claims 7-9, 12 and 14-15 recite the limitation "the coding sequence" in line 3 of claim 7, line 2 of claims 8-9, lines 5 and 11 of claim 12, and lines 6 and 11 of claim 14. There is improper antecedent basis for this limitation in the claims.

Appropriate action/corrections are required.

### *Claim Rejections - 35 USC § 112*

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

8. Claims 1-14 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for an isolated nucleic acid molecule encoding a delta 12-fatty acid epoxygenase enzyme which has the amino acid sequence of SEQ ID NO: 2 and a transgenic plant comprising said nucleic acid molecule, does not reasonably provide enablement for a) a nucleic acid molecule encoding a delta 12-fatty acid epoxygenase enzyme comprising an amino acid sequence which is at least about 80% homologous to SEQ ID NO: 2, homologues, analogues or derivatives thereof b) SEQ ID NO: 2 homologues, analogues or derivative thereof, and c) any host cell comprising a nucleic acid encoding SEQ ID NO: 2. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to practice the invention commensurate in scope with these claims, and a method of producing said transgenic plant.

The claims are broadly drawn to an isolated nucleic acid molecule encoding a delta 12-fatty acid epoxygenase enzyme, a chimeric gene, a vector, a host cell, plant cell or plant comprising said nucleic acid

Specification teaches a PCR based approach of isolating a nucleic acid sequence (cDNA, SEQ ID NO: 1) encoding delta 12-fatty acid epoxygenase enzyme which comprises an amino acid sequence of SEQ ID NO: 2. The specification further teaches transgenic of *Arabidopsis* plant obtained through the transformation of a wild type *Arabidopsis* plant with a plant expression vector comprising said nucleic acid. The transgenic plant expressing SEQ ID NO: 1 accumulated epoxy fatty acids in the seeds. See pages 13-15, example 1-4, page 15-16, table 1.

Claim 1 is directed to a nucleic acid molecule encoding a delta 12-fatty acid epoxygenase enzyme comprising an amino acid sequence which is at least about 80% homologous to SEQ ID NO: 2 or a homologue, an analogue or a derivative thereof. Claim 12 is directed to a host cell comprising said nucleic acid molecule, whereas claim 14 is directed to a plant comprising said nucleic acid molecule. Furthermore, claim 2 is directed to a nucleic acid molecule encoding a delta 12-fatty acid epoxygenase enzyme comprising an amino acid sequence which is at least about 90% homologous to SEQ ID NO: 2 or a homologue, an analogue or a derivative thereof. Further, claim 3 is directed to a nucleic acid molecule encoding a delta 12-fatty acid epoxygenase enzyme comprising an amino acid sequence which is at least about 95% homologous to SEQ ID NO: 2 or a homologue, an analogue or a derivative thereof. Also, claim 4 is directed to a nucleic acid molecule encoding a delta 12-fatty acid epoxygenase enzyme comprising an amino acid sequence which is at least about 98% homologous to SEQ ID NO: 2 or a homologue, an analogue or a derivative thereof. In addition, claims 1-4 and 12-14 are directed to nucleic acid molecules encoding a delta 12-fatty acid epoxygenase enzyme comprising an amino acid sequence which is a homologue, an analogue or derivative of SEQ ID NO: 2. This implies that these claims and claims dependent thereon encompass a nucleic acid molecule encoding a polypeptide having less than 100% sequence identity to SEQ ID NO: 2, which has epoxygenase activity.

Specification provides guidance on a method of using a nucleic acid molecule encoding SEQ ID NO: 2 to produce transgenic seeds with increased accumulation of epoxy fatty acids, such as vernolic acid. The specification does not provide guidance on a method of using a nucleic acid molecule encoding a delta 12-fatty acid

epoxygenase enzyme and comprising an amino acid sequence which has at least 80% sequence identity to SEQ ID NO: 2. Neither the state of prior art nor the specification provide guidance on which region(s) protein SEQ ID NO: 2 can be altered without abrogating delta 12-fatty acid epoxygenase activity. Neither the specification nor the prior art provide guidance on the conserved (including signature pattern) and non-conserved regions of said polypeptide (including SEQ ID NO: 2) that are essential for maintaining 3-dimensional stable structure of the protein with epoxygenase activity.

Keskin et al. (Protein Science, 13:1043-1055, 2004) teach that proteins with similar structure may have different functions. Thornton et al. (Nature structural Biology, structural genomics supplement, November 2000) teach that structural data may carry information about the biochemical function of the protein. It's biological role in the cell or organism is much more complex and actual experimentation is needed to elucidate actual biological function under *in vivo* conditions. Furthermore, Guo et al. (PNAS, 101: 9205-9210, 2004) teach that there is a probability factor of 34% that a random amino acid replacement in a given protein will lead to its functional inactivation. In the instant case, such a probability factor will be much higher as amino acid sequences having at least 80% sequence identity to SEQ ID NO: 2, homologues, analogues or derivative thereof would encompasses more than a single amino acid changes of SEQ ID NO: 2. Accordingly, it would have been highly unpredictable that a nucleotide sequence having at least about 80% sequence identity to SEQ ID NO: 2 would encode a polypeptide which retains epoxygenase activity when expressed in a plant. Neither the state of art nor Applicants provide guidance as to how inoperable embodiments can be readily eliminated other than random trial and error. Undue experimentation would have been

required by a skilled artisan at the time claimed invention was made to determine how nucleic acid molecules encoding a protein which is not 100% identical in sequence to SEQ ID NO: 2 would be used in a method to provide epoxygenase activity when expressed in a plant. The sequences that are not 100% identical to SEQ ID NO: 2 would encompass homologues, analogues or derivatives of SEQ ID NO: 2. See Genentech, Inc. v. Novo Nordisk, A/S, USPQ2d 1001, 1005 (Fed. Cir. 1997), which teaches that "the specification, not the knowledge of one skilled in the art" must supply the enabling aspects of the invention.

Claim 12 is directed to any host cell comprising a nucleic acid molecule encoding SEQ ID NO: 2. The specification clearly provides guidance on the use of a bacterial or plant host cell comprising transforming said host cell with a nucleic acid molecule encoding an amino acid sequence of SEQ ID NO: 2. However, specification does not provide guidance on a method of using a transformed host cell other than a bacterial or plant cell with a nucleic acid molecule encoding a protein of SEQ ID NO: 2. Undue experimentation would have been required by a skilled artisan to determine how to use any host cell other than bacterial or plant cell comprising a nucleic acid molecule encoding SEQ ID NO: 2.

Claim 14 is directed to expressing a nucleic acid molecule encoding SEQ ID NO: 2 with 12-fatty acid epoxygenase activity in any plant tissue including seed. Specification provides guidance on using SEQ ID NO: 1 encoding SEQ ID NO: 2 to increase epoxy fatty acids in plant seed. Neither the prior art nor the specification provides guidance on a method of using a nucleic acid molecule encoding SEQ ID NO: 2 to produce transgenic tissues other than the seed with epoxygenase activity.

Furthermore, specification does not provide guidance on the existence of substrates for SEQ ID NO: 2 in tissues other than seeds. Undue experimentation would have been required by a skilled artisan to determine how to use a nucleic acid molecule encoding SEQ ID NO: 2 in a method to produce a plant which exhibits epoxygenase activity in tissues other than the seed.

Given the breadth of the claims, unpredictability of the art and lack of guidance of the specification, as discussed above, undue experimentation would be required by one skilled in the art to make and use the claimed invention. Therefore, it is maintained that the claimed invention is not enabled as commensurate in scope with the claims.

9. Claims 1-14 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The claims are broadly drawn to an isolated nucleic acid molecule encoding a delta 12-fatty acid epoxygenase enzyme, a chimeric gene, a vector, a host cell, plant cell or plant comprising said nucleic acid.

Specification describes a PCR based approach of isolating a nucleic acid sequence (cDNA, SEQ ID NO: 1) encoding delta 12-fatty acid epoxygenase enzyme which comprises an amino acid sequence of SEQ ID NO: 2. The specification further describes transgenic of *Arabidopsis* plant obtained through the transformation of a wild type *Arabidopsis* plant with a plant expression vector comprising said nucleic acid. The

transgenic plant expressing SEQ ID NO: 1 accumulated epoxy fatty acids in the seeds. See pages 13-15, example 1-4, page 15-16, table 1.

Claim 1 is directed to a nucleic acid molecule encoding a delta 12-fatty acid epoxygenase enzyme comprising an amino acid sequence which is at least about 80% homologous to SEQ ID NO: 2 or a homologue, an analogue or a derivative thereof. Claim 12 is directed to a host cell comprising said nucleic acid molecule, whereas claim 14 is directed to a plant comprising said nucleic acid molecule. Furthermore, claim 2 is directed to a nucleic acid molecule encoding a delta 12-fatty acid epoxygenase enzyme comprising an amino acid sequence which is at least about 90% homologous to SEQ ID NO: 2 or a homologue, an analogue or a derivative thereof. Further, claim 3 is directed to a nucleic acid molecule encoding a delta 12-fatty acid epoxygenase enzyme comprising an amino acid sequence which is at least about 95% homologous to SEQ ID NO: 2 or a homologue, an analogue or a derivative thereof. Also, claim 4 is directed to a nucleic acid molecule encoding a delta 12-fatty acid epoxygenase enzyme comprising an amino acid sequence which is at least about 98% homologous to SEQ ID NO: 2 or a homologue, an analogue or a derivative thereof. In addition, claims 1-4 and 12-14 encompass nucleic acid molecules encoding a delta 12-fatty acid epoxygenase enzyme comprising an amino acid sequence which is a homologue, an analogue or derivative of SEQ ID NO: 2. This implies that these claims and claims dependent thereon encompass a nucleic acid molecule encoding a polypeptide having less than 100% sequence identity to SEQ ID NO: 2, which has epoxygenase activity.

The specification does not have adequate written description for the genus of sequences which have at least 80% sequence homology or identity to instant SEQ ID

NO: 2, genus of sequences comprising homologues, analogues or derivatives of SEQ ID NO: 2 under current written description guidelines. Specification does not describe any of these structures and one skilled in the art cannot reliably predict the structure of these sequences based upon the disclosure of SEQ ID NOs: 1 and 2. Further, neither the prior art nor the specification describe these undisclosed structures of Applicants broadly claimed genus.

Furthermore, said structures of Applicant's broadly claimed genus are not correlated to the function of epoxygenase activity when expressed in a plant. Further, Applicants have failed to describe conserved functional domains that are shared by these undisclosed structures of Applicant's broadly claimed genus. Applicants have failed to reduce their broadly claimed genus to practice.

Accordingly, there is lack of adequate description to inform a skilled artisan that applicant was in possession of the claimed invention at the time of filing. See Written Description guidelines published in Federal Register/Vol.66, No. 4/Friday, January 5, 2001/Notices; p. 1099-1111.

Given the claim breadth and lack of guidance as discussed above, the specification does not provide written description of the genus broadly claimed. Accordingly, one skilled in the art would not have recognized Applicants to have been in possession of the claimed invention at the time of filing.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

10. Claims 1 and 7-14 are rejected under 35 U.S.C. 102(b) as anticipated by Hitz et al. (U.S. Patent No. 5,846,784, Published December 8, 1998).

Hitz et al. disclose an isolated nucleic acid molecule encoding the protein of SEQ ID NO: 4 which has 87.3% sequence identity to instant SEQ ID NO: 2 and exhibits epoxygenase activity. The reference further discloses a chimeric gene, a chimeric construct, an expression vector, transformed plant cell or transgenic plant comprising said nucleic acid molecule, or wherein chimeric construct comprises phaseolin promoter as regulatory sequence. See abstract, columns 1-12, examples 1-6 and claims 5-12, 16 and 17.

Accordingly, Hitz et al. anticipate the claimed invention.

***Conclusion***

11. No claims are allowed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Vinod Kumar whose telephone number is (571) 272-4445. The examiner can normally be reached on 8.30 a.m. to 5.00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Anne Marie Grunberg can be reached on (571) 272-0975. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

DAVID H. KRUSE, PH.D.
PRIMARY EXAMINER